

## **BACKGROUND OF THE INVENTION**

### **FIELD OF THE INVENTION**

The present invention relates generally to the field of wetsuits used for diving, surfing and the like, and more specifically to an improved wetsuit made of a multiple layer laminated fabric having inflatable air channels in a selected portion of the wetsuit. A valve is provided to permit selective inflation of the air channels to induce a plurality of inflated regions preferably in an aesthetically attractive pattern. The selected portion, when inflated, also provides added thermal insulation and impact protection.

### **BACKGROUND ART**

There have been numerous disclosures of wetsuits which employ a fabric carrying internal channels, sacs and the like for containing a material for better controlling temperature. By way of example, U.S. Patent No. 5,960,469 to Nuckols et al discloses a wetsuit or drysuit having an internal manifold for circulating an insulating liquid near the skin to protect a diver in cold water. In another example, U.S. Patent No. 6,004,662 to Buckley discloses a laminated composite material containing a thermal buffer in the form of phase change material embedded in capsules. Other prior art discloses wetsuits designed to protect the wearer against inadvertent impact. For example, U.S. Patent No. 6,434,749 to Grounds et al, discloses a wetsuit having inserted pads in selected areas. The pads are placed in pockets which may be between wetsuit layers or in sealed sacs containing a gel, water or air.

Such prior art tends to be either very cumbersome, or irreversible and generally does nothing to add to the aesthetic appearance of the wetsuit.

1           It would be highly advantageous to have a wetsuit made of a fabric having built-  
2 in channels for receiving a gas such as air which could add to the thermal insulation  
3 properties of the fabric while also affording a degree of impact protection. It would also  
4 be advantageous if such a fabric employed such channels in a selected pattern which  
5 added to the aesthetic appearance of the wetsuit when inflated. Moreover, it would be  
6 useful if such channels could be selectively inflated and deflated by the wetsuit wearer  
7 with minimal effort and inconvenience.

## SUMMARY OF THE INVENTION

The present invention comprises a wetsuit and wetsuit fabric made of a multi-layer laminated fabric material having a plurality of interconnected air channels formed between the fabric layers. The air channels are formed by unattached regions between fabric layers that are otherwise attached such as by gluing. The unattached regions are free to separate from each other and expand in response to pressure from a gas such as air under pressure. The air is preferably introduced through a valve such as by the wearer blowing air into the valve to fill the air channels thereby expanding these "unglued" regions. In a preferred embodiment, the air channels are selectively shaped to form a plurality of adjacent cells, thereby adding to the aesthetic appearance of the wetsuit fabric.

In the embodiment described herein, these cells are hexagonal in shape, however, it will be understood that these cells may be virtually any shape depending simply on the path chosen for the air channels. The disclosed embodiment illustrates application of the invention in the front and back chest area of a wetsuit. However, it will also be understood that the fabric employing expandable air channels may be employed at virtually any location in a wetsuit as well as in accessories such as gloves, boots and hoods. Irrespective of their shape and location, the expandable air channels within the layers of a wetsuit fabric, provide increased thermal insulation, improved impact protection and a new aesthetic effect in the wetsuit design. All of these advantages are achieved without substantially complicating the manufacture of the wetsuit fabric by simply controlling the application of glue between the fabric layers such as by embossing the glue in a selected pattern before joining the layers.

## BRIEF DESCRIPTION OF THE DRAWINGS

The aforementioned objects and advantages of the present invention, as well as additional objects and advantages thereof, will be more fully understood hereinafter as a result of a detailed description of a preferred embodiment when taken in conjunction with the following drawings in which:

FIG. 1 is a plan view of a preferred embodiment of a wetsuit in accordance with the present invention, shown in a deflated configuration;

FIG. 2 is a view similar to FIG. 1, but shown in an inflated configuration;

FIG. 3 is a rear view of the preferred embodiment shown in the inflated configuration;

FIG. 4 is an enlarged front view of the chest portion of the wetsuit of FIG. 2;

FIG. 5 is a cross-sectional view of the deflated chest portion taken along lines 6-6 of FIG. 4;

FIG. 6 is a cross-sectional view of the inflated chest portions taken along lines 6-6 of FIG. 4;

FIG. 7 is an enlarged view of a portion of the cross-section of FIG. 5;

FIG. 8 is an enlarged view of a portion of the cross-section of FIG. 6;

1 FIG. 9 is a still further enlarged front view of the chest portion;

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3 FIG. 10 is a greatly enlarged cross-sectional view taken along lines 10-10 of  
4 FIG. 9; and

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6 FIG. 11 is a view similar to FIG. 10, but taken along lines 11-11 of FIG. 9.  
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## DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT

Referring to the accompanying drawings, it will be seen in FIGs. 1-11 that in a preferred embodiment of the present invention, a wetsuit 10 comprises a unique chest portion 11. This portion of the wetsuit has uniquely constructed fabric comprising an outer layer 12 and an inner layer 13 wherein selected regions therebetween are left unattached by omitting the glue that otherwise affixes the layers together everywhere else in the wetsuit fabric. These regions are of selected size, shape and location to form a plurality of interconnected air channels 15 which are seen best in FIGs. 10 and 11. The network of interconnected air channels shown for example in FIG. 4, are in fluid communication with a valve preferably extending from the upper chest area of the wetsuit 10 to provide easy access to the wearer's mouth when it is desired to fill the air channels 15 with pressurized air. When this occurs, the relatively flat chest uninflated portion 11 (shown in FIG. 1) takes on the rather unique inflated design appearance shown in FIG. 2. The effect of inflating the air channels through valve 14 may be best understood by comparing FIGs. 5 and 6 and by comparing FIGs. 7 and 8. In FIGs. 5 and 7, the air channels 15 are uninflated and the adjacent layers of fabric are close together having virtually the same appearance as those portions of the wetsuit 10 without air channels such as the legs, arms, etc. However, when the wearer forcefully exhales through the valve 14, the air channels 15 fill with pressurized air thereby expanding as shown in FIGs. 6 and 8 and forming inflated or raised regions 16 which alter the external appearance of the chest portion of the wetsuit.

As shown in FIGs. 9-11, the air channels 15 are preferably shaped to form non-inflated regions or cells which have a uniform pattern that may add to the aesthetic appearance of the wetsuit. By way of illustration, the embodiment shown herein has such cells which have a hexagonal shape. However, it will be understood that the shape of the air channels, and thus of the uninflated areas between air channels as

1 well, may be virtually any configuration, limited only by the imagination of the  
2 manufacturer of the wetsuit fabric. Thus one may readily create cells of other shapes  
3 including, for example, round, rectangular, triangular and the like.  
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5 Although, a principal advantage of the present invention is the enhanced  
6 aesthetic appearance of a wetsuit incorporating selected regions having such patterns  
7 of air channels, other potential benefits are also derived therefrom. The inflated  
8 channels tend to provide improved temperature insulation which can be beneficial to  
9 divers in cold water. Moreover, the inflated channels provide limited resistance to  
10 inadvertent impact by helping to dissipate the kinetic energy of an incident blow to the  
11 diver's body.  
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13 Based upon the foregoing, it will now be understood that the present invention  
14 comprises an improved wetsuit and wetsuit fabric which provides significant  
15 advantages in the wetsuit art. Although a preferred embodiment of the invention has  
16 been disclosed herein, the illustrated example is for purposes of facilitating a better  
17 understanding of the inventive features and should not be deemed to be limiting of the  
18 invention's scope. Therefore, the protection afforded herein is to be limited only by the  
19 appended claims and their equivalents.  
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21 I claim:  
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